Drainage Considerations for Bicycle & Pedestrian Facilities

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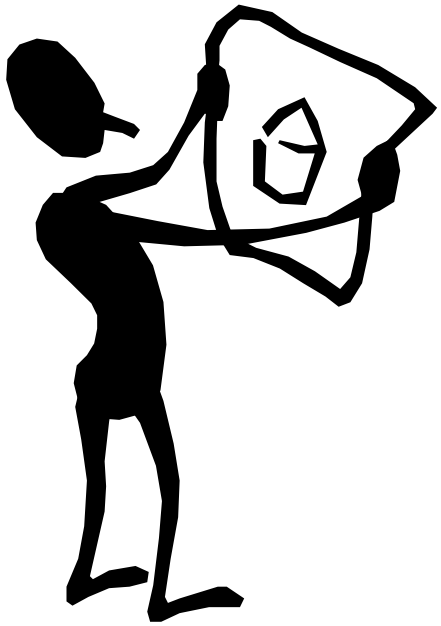
State Roadway Design Office

2012 Design Training Expo

Outline

- Bicycle Way
- Pedestrian Way
- Storm Drain Handbook Tables
- Drainage Standard Indexes
- Examples



Bicycle Way

Any road, path or way which by law is open to bicycle travel, *regardless of whether such facilities are signed and marked for the preferential use by bicyclists* or are to be shared with other transportation modes.

Examples include bicycle lanes, paved shoulders, shared use paths, and traffic lanes.

Pedestrian Way

A space for pedestrian travel separated from traffic lanes. Sidewalks, shared use paths, footpaths and shoulders are considered to be pedestrian ways.

However, footpaths and shoulders are not *accessible* facilities, since they lack specific improvements or provisions to accommodate persons using mobility aids.

Storm D[…]ndbook

Notes

See Index 218 Inset B

See Index 219 Inset B & C

See Index 220 Bar Stub Detail

Storm Drain Handbook

[…]ain Handbook
[…]ebruary 2012

BICYCLE COMPATIBLE	ACCE[…] PED[…] W[…]	TRAFFIC

213	8	Separator IV & V	Continuous or Sa[…]		Inside
214	9 [2]	D & F	Continuous or Sa[…]		Outside
215	10 [2]	D & F	Continuous or Sa[…]		Outside
221	V	Valley	Continuous or Sa[…]		N/A

[1] Double throated inlets are usually not warranted unless the minor gutter flow exceeds 50 feet in length or 0.5 CFS.
[2] Curb Inlets 9 and 10 are to be used only where flows are light and right of way does not permit the use of throated curb inlets.
[3] These are double inlets; one on each side of the barrier wall.
[4] May be used by specifying the reticuline grate.
[5] Bicycle compatible provided a minimum 4ft riding surface is provided around the inlet, with a preferred 1 ft offset from the inlet. Consider use of pavement markings shown in the 2009 MUTCD to alert cyclist to the inlet in the bicycle lane or shoulder pavement.

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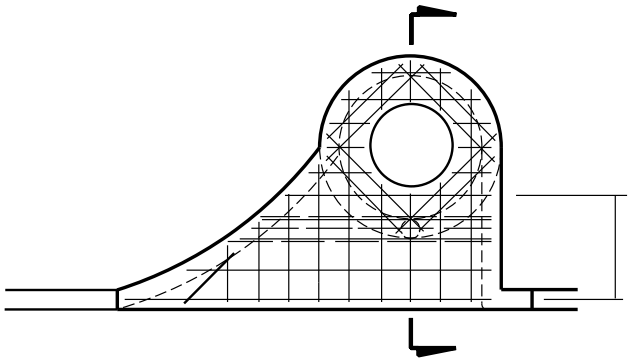
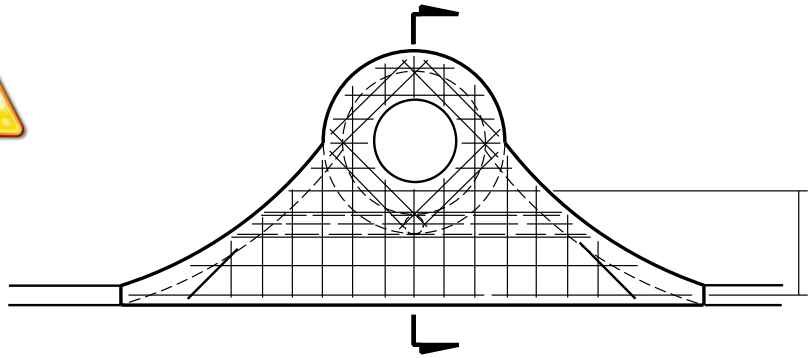
Consider use of pavement markings shown […] in the bicycle lane or shoulder pavement.

Curb Inlet Type 1 or 3

Index 210 – Curb Inlet 1-4

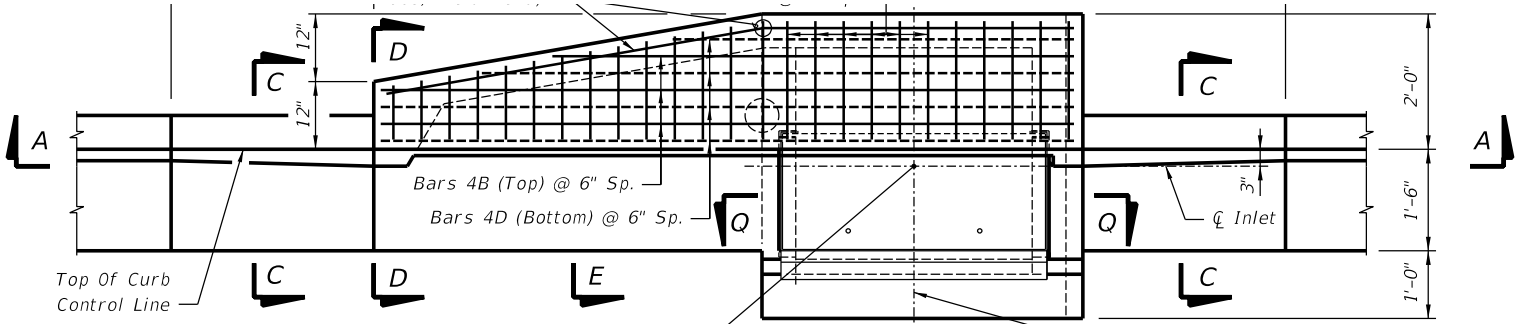
- What Makes it Great
  - Manhole in sidewalk
  - Occasional pedestrian traffic
  - Hydraulically efficient
  - Bicycle Compatible
- What you need to watch for
  - Curb returns! Do not place in cross walk
- Plan Notes
  - No additional notes required





Typical Application of Index 211 Curb Inlet Type 5 in standard curb

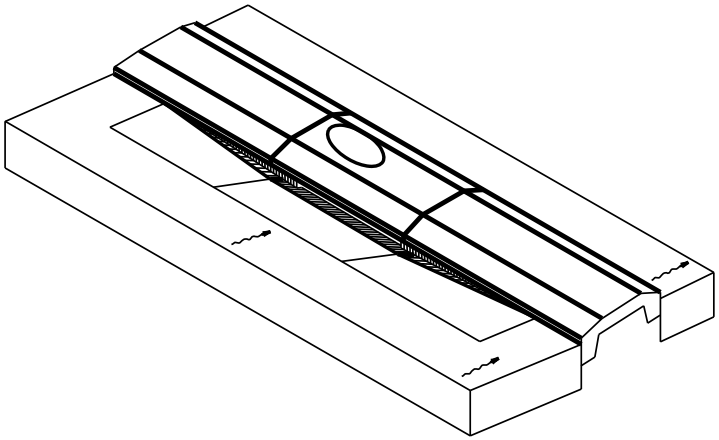
Index 211 – Curb Inlet 5 & 6



- Hydraulically efficient
- Bicycle Compatible
- Areas of occasional pedestrian traffic
- Curb returns! Do not place in cross walk

Application of Index 212 Curb Inlet Type 7 / Index 213 Curb Inlet Type 8 for Traffic Separator

Index 212 & 213 – Curb Inlet 7 & 8

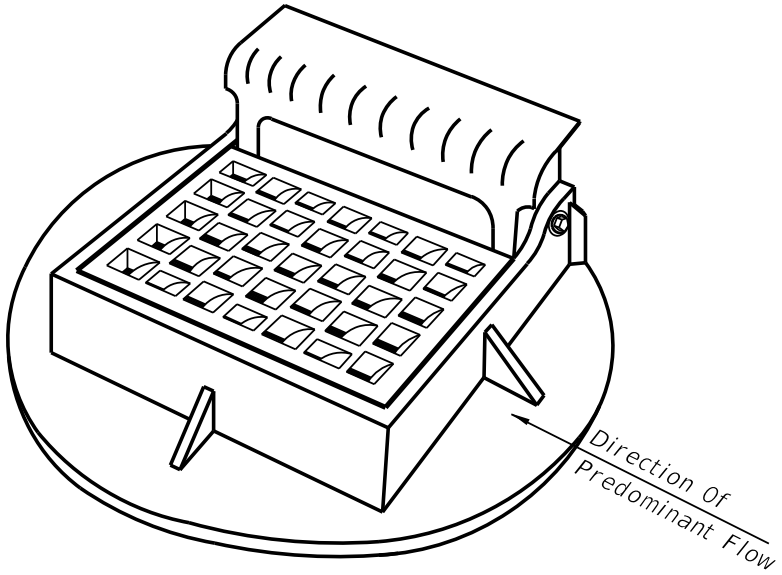


- Hydraulically efficient
- Bicycle Compatible
- Pavement Transition Slope (20%)
- Curb returns! Do not place in cross walk

Application of Index 214 Curb Inlet Type 9 / Index 215 Curb Inlet Type 10

Index 214 & 215 – Curb Inlet 9 & 10

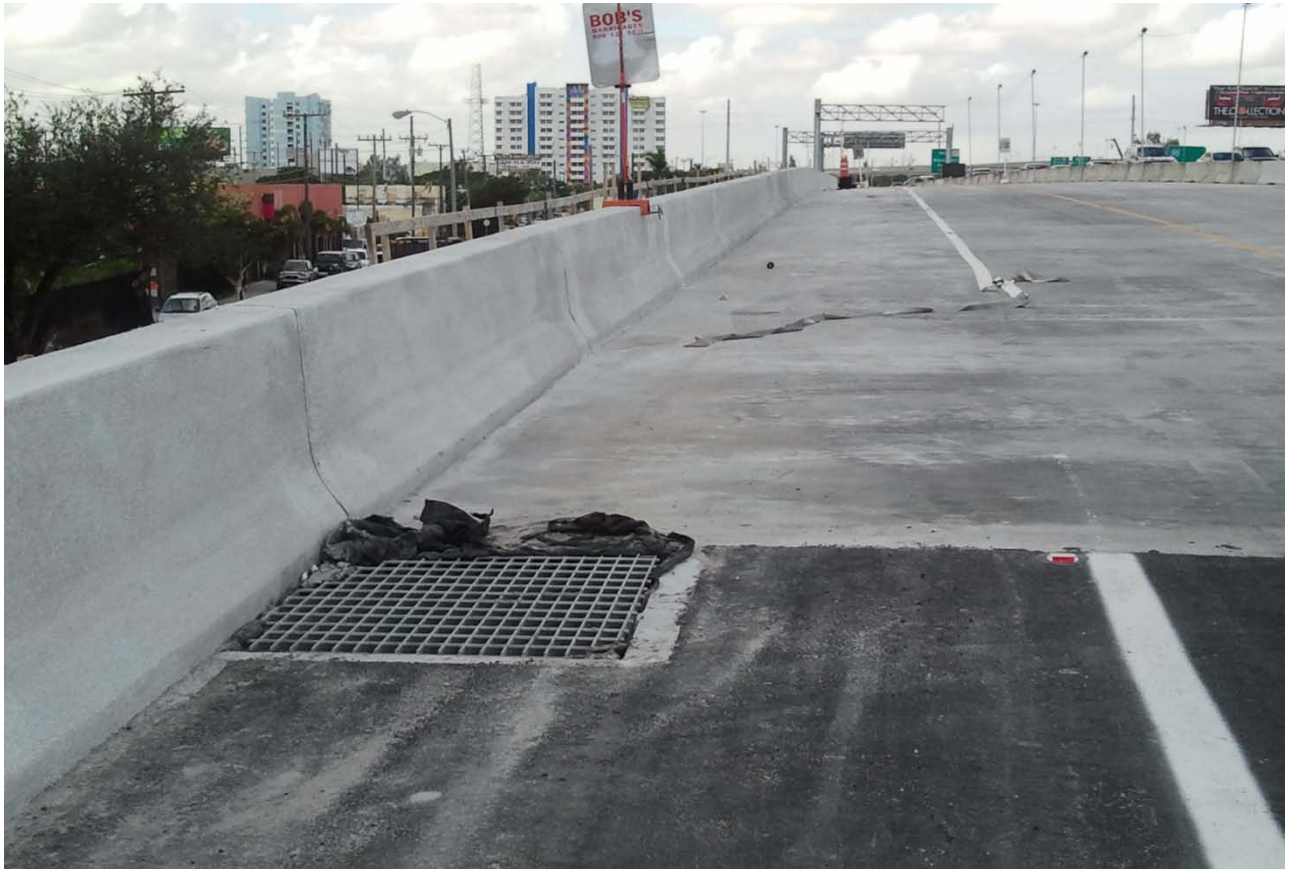
- Suitable for bicycle and occasional pedestrian traffic
- Locations with vertical face curbs
- Not as efficient hydraulically
- ADA



Typical Application of Index 217 Median Barrier Wall Inlet

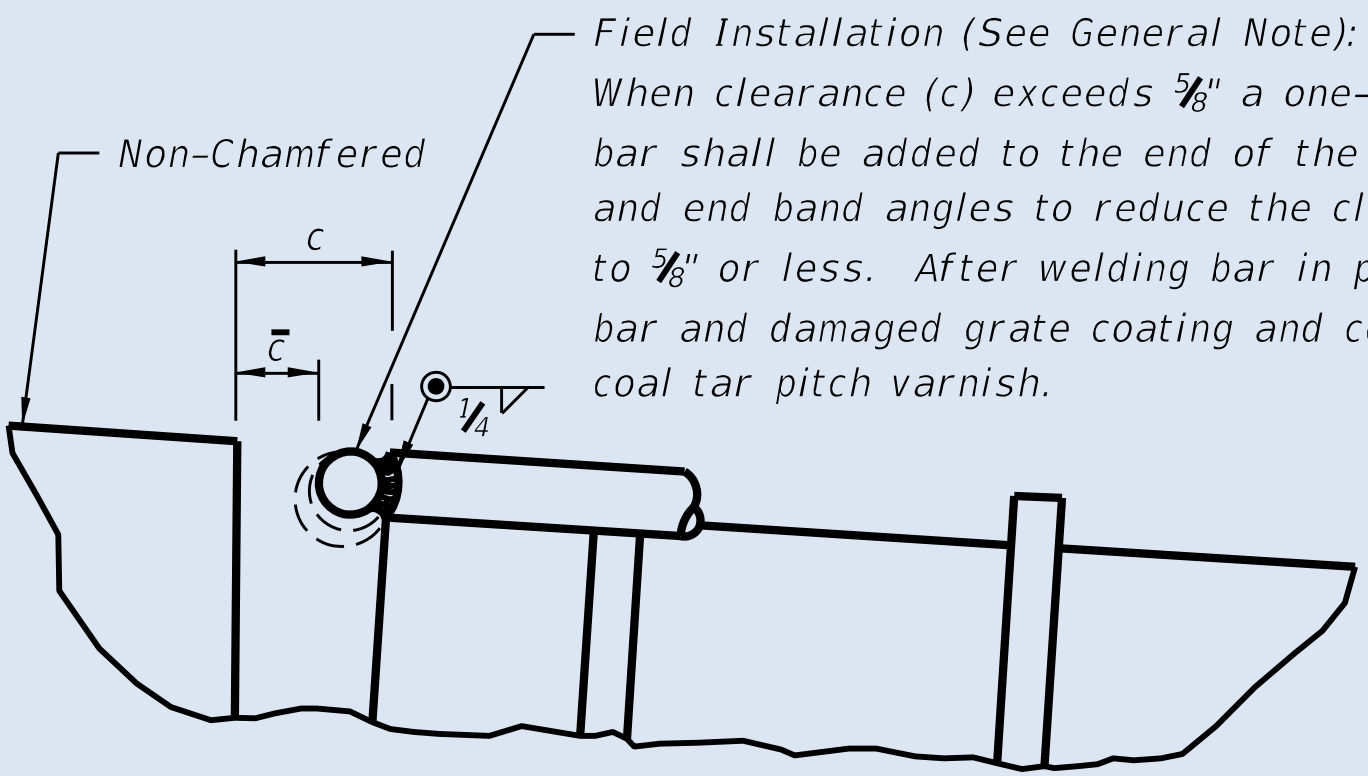
Index 217– Median Barrier Inlet

- Hydraulically efficient
- Grate cross slope
- Consider whether bicycle traffic may travel as part of MOT phasing
- Parallel bar grate used unless RETICULINE is specified in plans



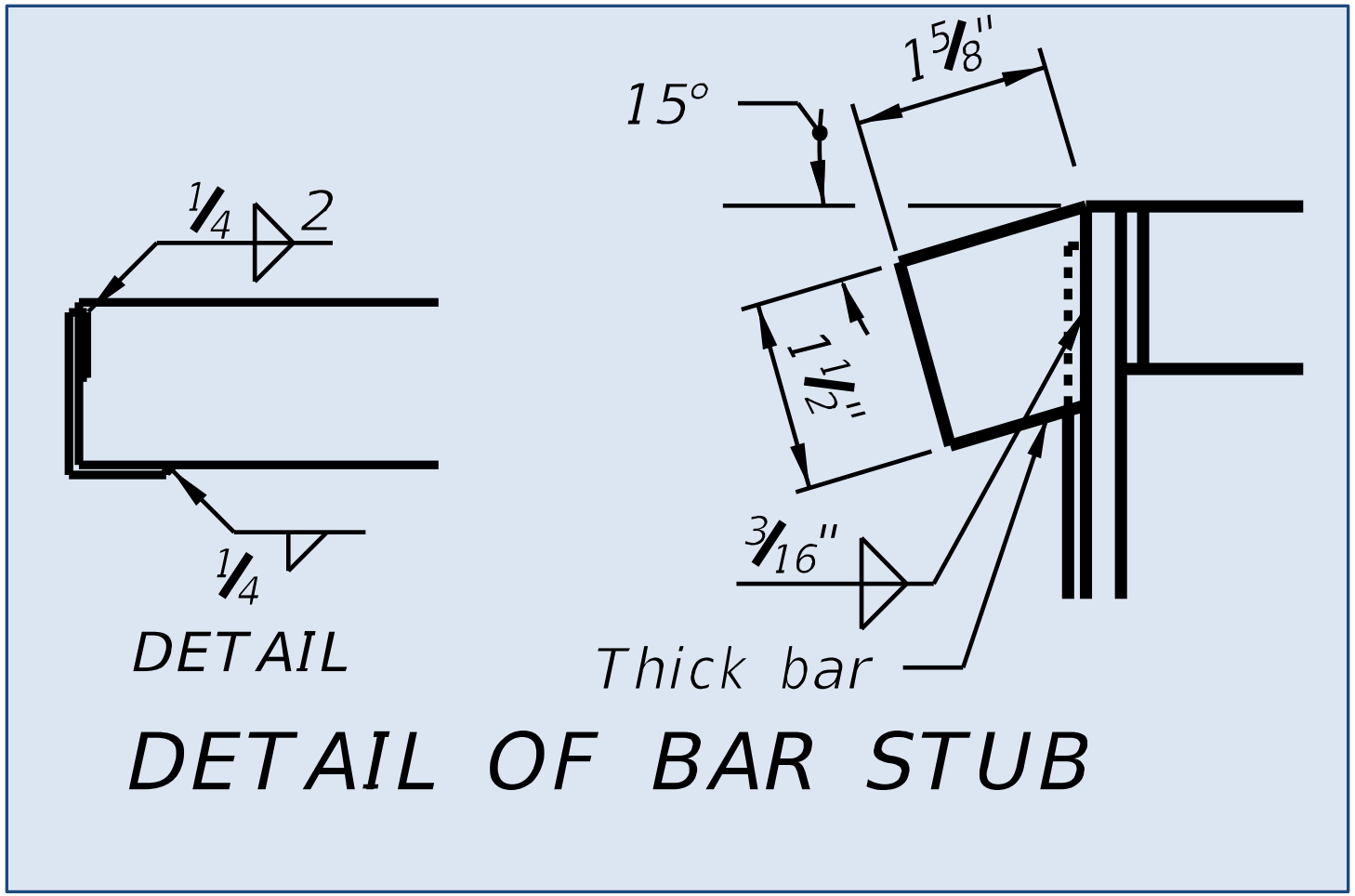
Typical Application of Index 218 Barrier Wall Inlet

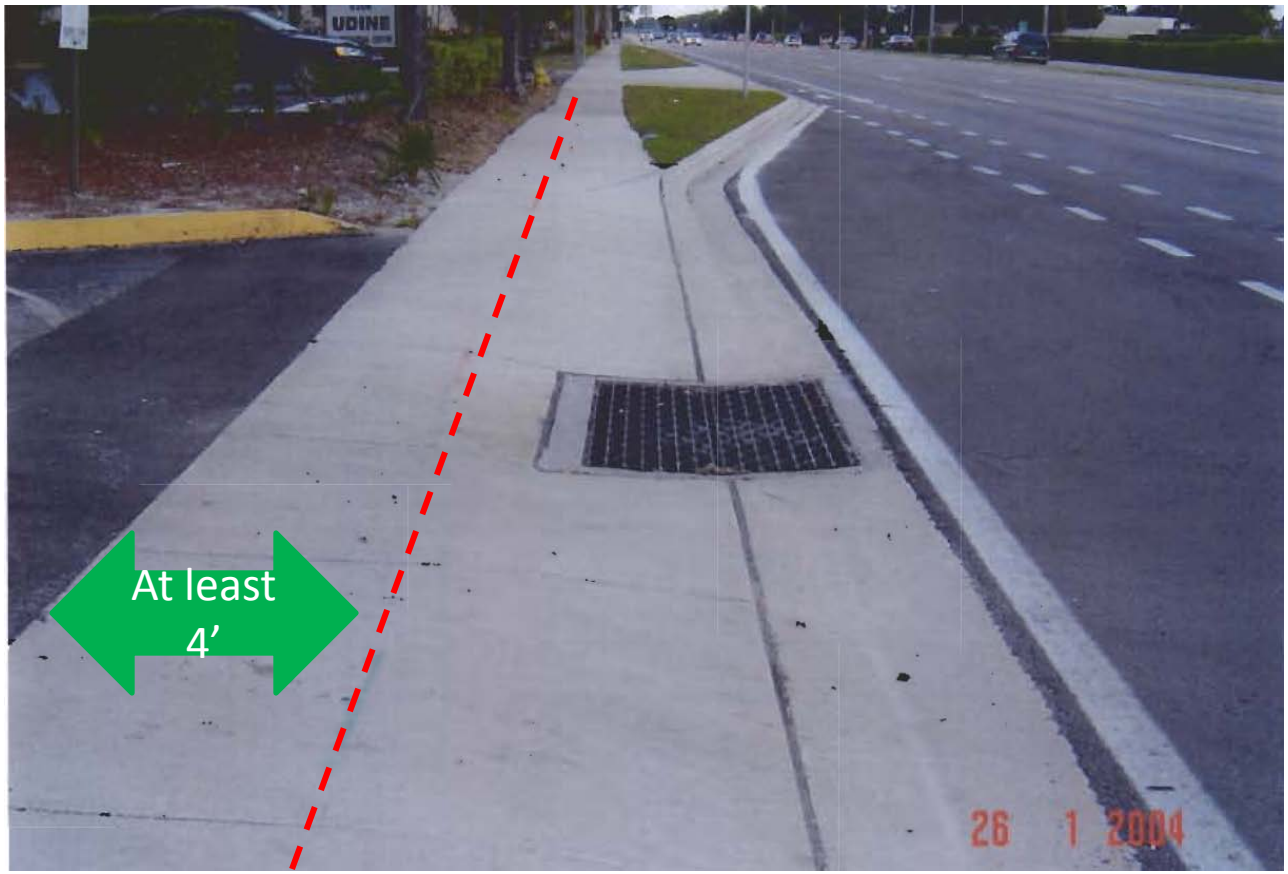
Index 218 – Barrier Wall Inlet



Typical application of Gutter Inlet Type S

Index 220 – Gutter Inlet Type S

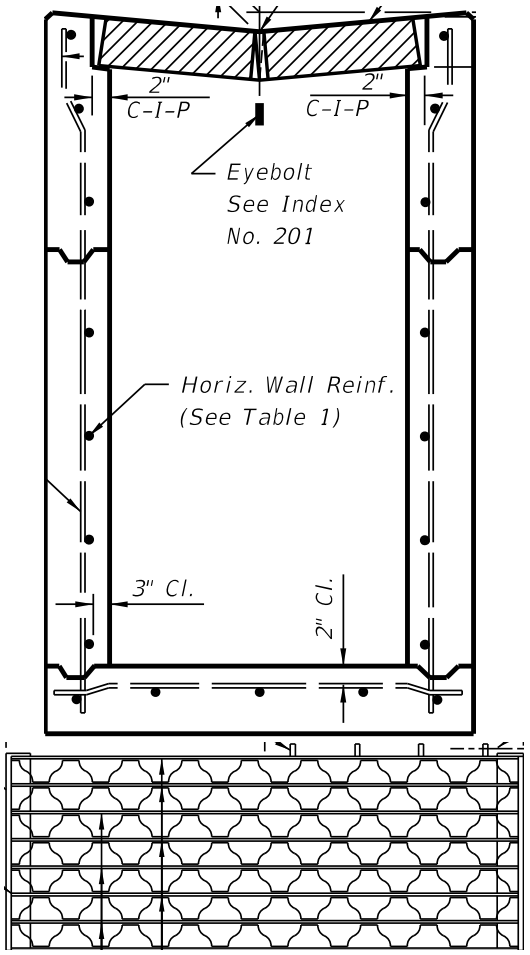




Typical Application of Type V

Index 221– Gutter Inlet Type V

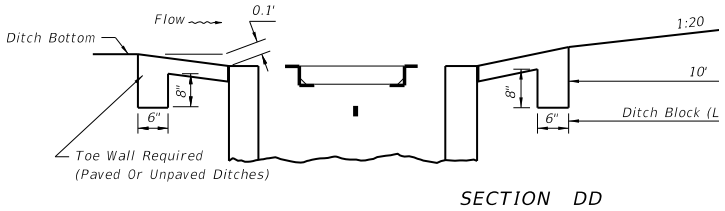
- Locate in swales or ditches
- Areas of occasional pedestrian traffic
- Consider cyclist in paved areas – gap between structure and grate as well as slope of grates.



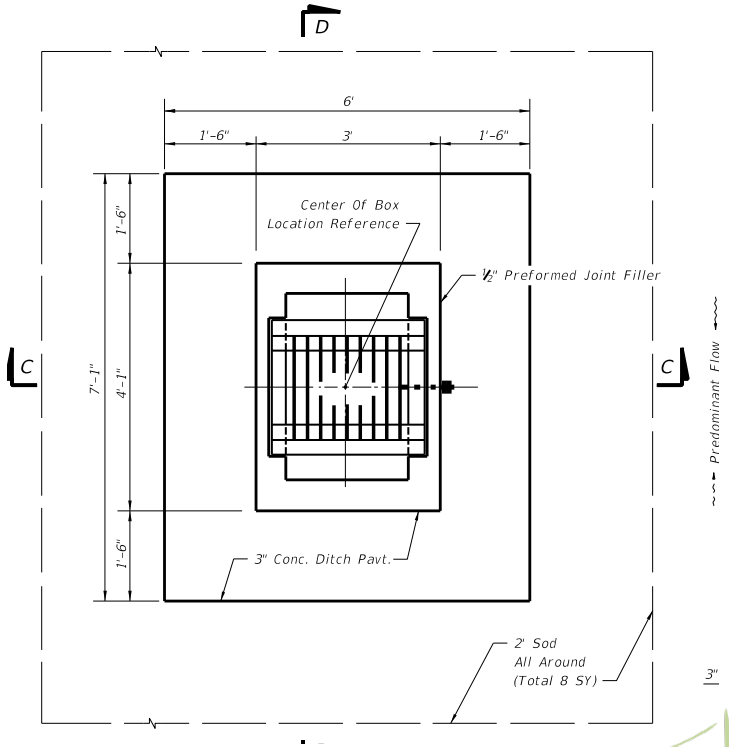
Application of Index 230 – DBI Type A

Index 230 – Ditch Bottom Inlet A

- Great hydraulically
- Great for high debris areas
- Limited access only
- No cyclists or pedestrians



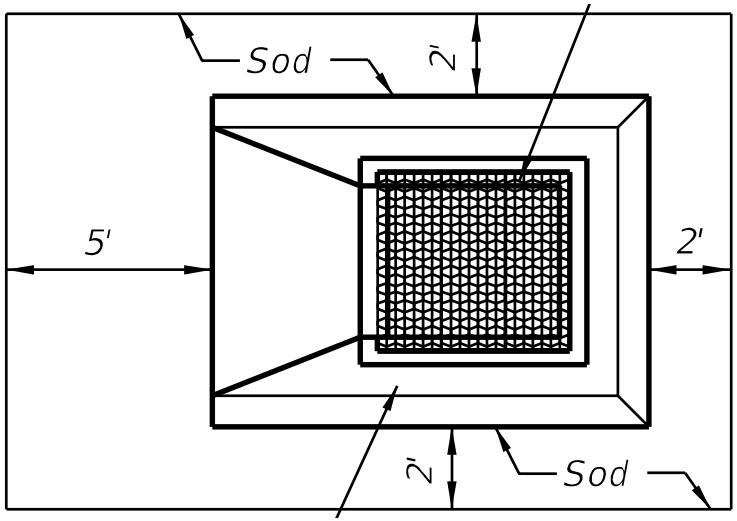
SECTION DD



Application of Index 231 DBI Type B

Index 231 – DBI Type B

- Heavy wheel loads
- Areas of occasional pedestrian traffic
- Bicycle or pedestrian way



Index 232 Type D reticuline grate with slot

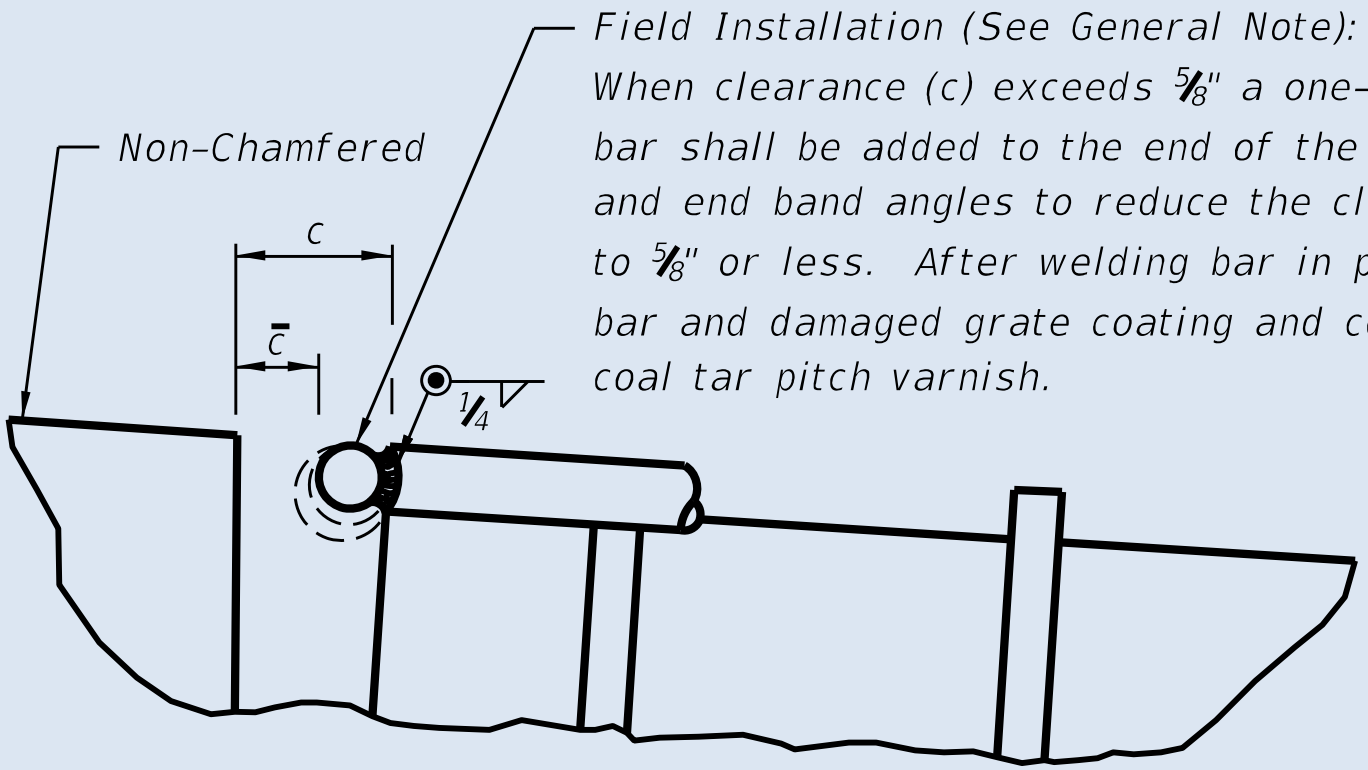
DBI with cast iron grate

Index 232 – DBI C, D, E, & H

- Bike/ped way ok
- Review grate opening direction vs. bicycle direction
- Traversable slots! Not for bike/ped
- Require steel grate in plans if tire inline with cast iron grate.

Application of Index 233 DBI Type F & G

Index 233 – DBI Types F &G



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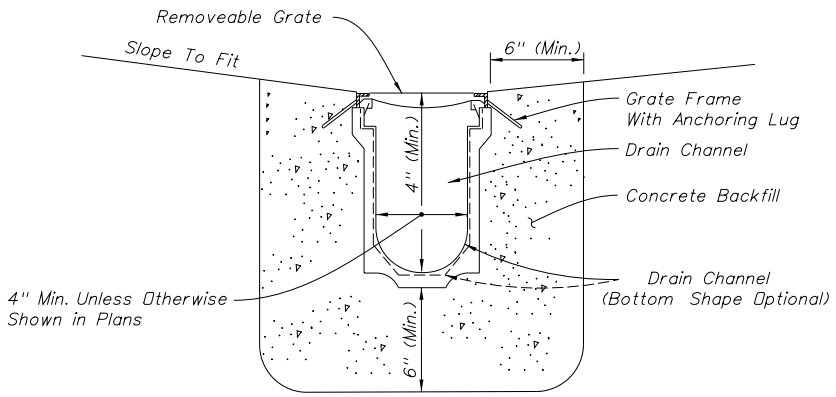
Applications of Index 206 Type II Trench Drain

Index 206 – Trench Drain

- Size to meet need
- ADA grate
- Curb ramp friendly
- Type II Only
- See Design Notes for plan note requirements



PREFORMED CHANNEL WITH REMOVABLE GRATE

SEE SHEET 2 FOR TYPICAL LOCATIONS

TYPE II

GOOD BUT NOT GRATE

Non-standard pavement marking but effort to alert bicyclist

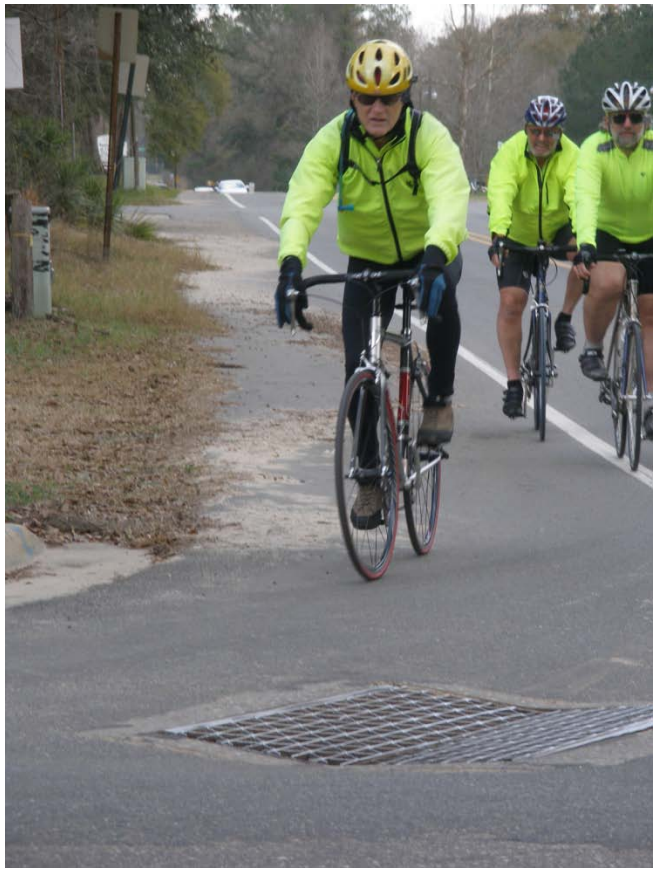
THE UGLY…

Application of Index 218 without Inset B roller bar

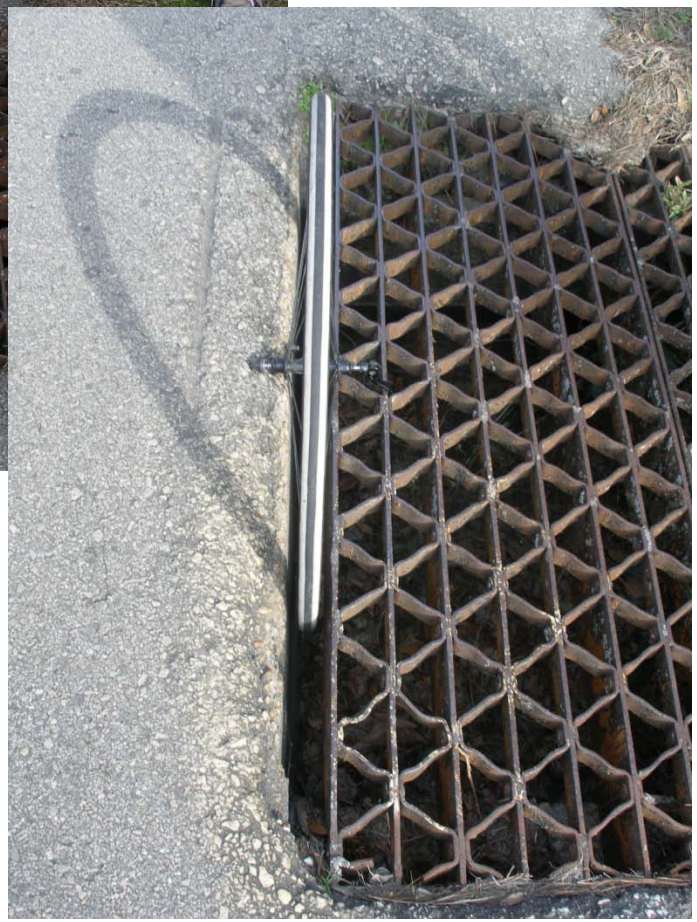
Traversable?

Inlets in curb returns!

Excessive overlays can be hazardous

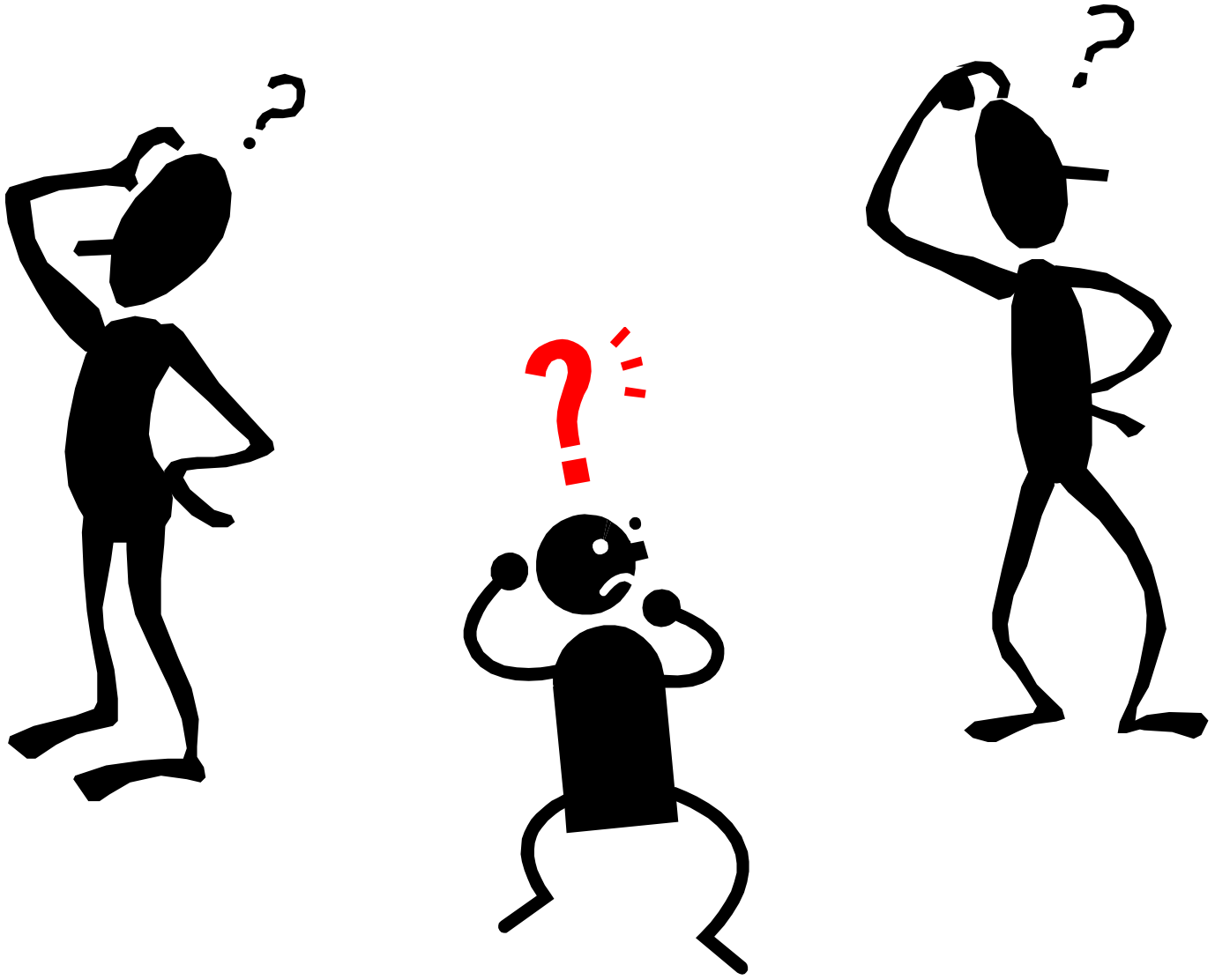


Non-standard placement of Shoulder Gutter Inlet



Gutter inlet vs. bike tire

Questions?



Contact Us!

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